

Studies on the terrestrial isopod crustaceans in Japan VI. Further supplements to the taxonomy

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Studies on the Terrestrial Isopod Crustaceans in Japan
VI. Further Supplements to the Taxonomy*

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日本産陸棲等脚目甲殻類の研究
VI. 重ねて、分類補遺

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本シリーズをまとめ始めてから7年が経過したが、各グループの記載後、新しい種類が発見されたので、前報に引き続き報告する。本報告で扱うグループはトウヨウワラジムシ科ならびにコシビロダンゴムシ科で、ともに本邦で著しく種分化を起こしているもので、それぞれ、4種類ならびに7種類を追加記載する。

トウヨウワラジムシ科	Trachelipidae STROUHAL, 1953
ハヤシワラジムシ属	<i>Nagurus</i> HOLTHUIS, 1949
ゴトウハヤシワラジムシ	<i>Nagurus gotoensis</i> n. sp.
ナカドウリハヤシワラジムシ	<i>Nagurus nakadoriensis</i> n. sp.
イズハラハヤシワラジムシ	<i>Nagurus izuharaensis</i> n. sp.
シロツシマワラジムシ	<i>Nagurus pallidus</i> n. sp.
コシビロダンゴムシ科	Armadillidae BRANDT & RATZENBURG, 1831
コシビロダンゴムシ属	<i>Sphaerillo</i> VERHOEFF, 1926
ヒウラコシビロダンゴムシ	<i>Sphaerillo hiurai</i> n. sp.
ヤンバルコシビロダンゴムシ	<i>Sphaerillo kunigamiensis</i> n. sp.
ヨコスジコシビロダンゴムシ	<i>Sphaerillo zonalis</i> n. sp.
トミヤマコシビロダンゴムシ	<i>Sphaerillo tomiyamai</i> n. sp.
クツゾコシビロダンゴムシ	<i>Sphaerillo soleiformis</i> n. sp.
アガタコシビロダンゴムシ	<i>Sphaerillo agataensis</i> n. sp.
コウズコシビロダンゴムシ	<i>Sphaerillo hasegawai</i> n. sp.

なお、本研究の一部は昭和63年度文部省科学研究費奨励研究B63917032の成果を含む。

Family Trachelipidae STROUHAL, 1953
Genus *Nagurus* HOLTHUIS, 1949

*Contributions from the Toyama Science Museum, No. 96

Nagurus gotoensis n. sp.

(Jap. name: Gotô-hayashi-warajimushi, new)

Fig.168

Material examined : 5♂♂ (1♂ holotype, 4.3 mm in body length, 4♂♂ paratypes 4.2~5.2 mm in body length 1♀ paratype, 4.1mm in body length) and 2♀♀ (1♀ allotype, 6.0 mm in body length), foot of Nanatsu-dake, Kishuku-cho, Fukue-jima, Nagasaki Pref., coll. Noboru Nunomura, July 8, 1988. Type series is deposited as follows: holotype(TOYA Cr-10842), allotype (TOYA Cr-10843) and 2 paratypes(TOYA Cr-10844~10845) at the Toyama Science Museum.

Description : Body 2.3 times as long as wide. Body colour brown with irregular paler patterns. Body surface granulated. Cephalon with a low triangular medial process and a pair of well developed lateral projections. Eyes mediocre in size and each eye composed of 14 ocelli; each peraeonal somite subequal in length but the posterior somites strongly recurved in both sides. Noduli lateralis on all the peraeonal somites are situated near the lateral margin. Pleonal somites 1~2 short; pleonal somites 3~5 with distinct epimera. Pleotelson triangular without any concavity.

First antenna(Fig.168 B); first segment cylindrical with a protrusion at the distal margin; second segment short; terminal segments rectangular with 6~7 aesthetascs at the tip.

Second antenna(Fig.168 C) rather long, reaching the posterior part of the third peraeonal somite. Peduncle long, first segment small; second and third segments twice as long as wide; fourth segment twice as long as the third, fifth peduncular segment 1.7 times as long as the fourth. Flagellum 2-segmented and 0.8 time as long as the fifth peduncular segment; second segment 2.8 times as long as the first.

Right mandible(Fig.168D); pars incisiva 3-headed; lacinia mobilis single-headed; processus molaris is represented by a tuft of hairy bristles.

Left mandible(Fig.168 E); pars incisiva 4-headed; lacinia mobilis 3-headed; processus molaris is represented by a tuft of hairy bristles.

First maxilla(Fig.168 F); outer lobe with 10 (4+6) entire teeth.

Second maxilla relatively narrow.

Maxilliped(Fig.168 G); endite stout with 4 spines; palp relatively stout.

First peraeopod(Fig.168 H); basis oblong; ischium rectangular; merus and carpus with a series of setae on inner margin; propodus with 4~5 fine setae on basal half and 2 stronger setae on distal half of inner margin.

Seventh peraeopod(Fig.168 I); basis oblong; ischium rectangular with a sternal margin; merus rectangular with 6 setae on inner margin; carpus rectangular and as long as merus, with 10~11 setae on inner margin; propodus long with 6 setae on inner margin.

Penes(Fig.168 J) narrow fusiform.

Male first pleopod(Fig.168 J); endopodite straight and its tip slightly bents outerwards; exopodite egg-shaped without any conspicuous concavity.

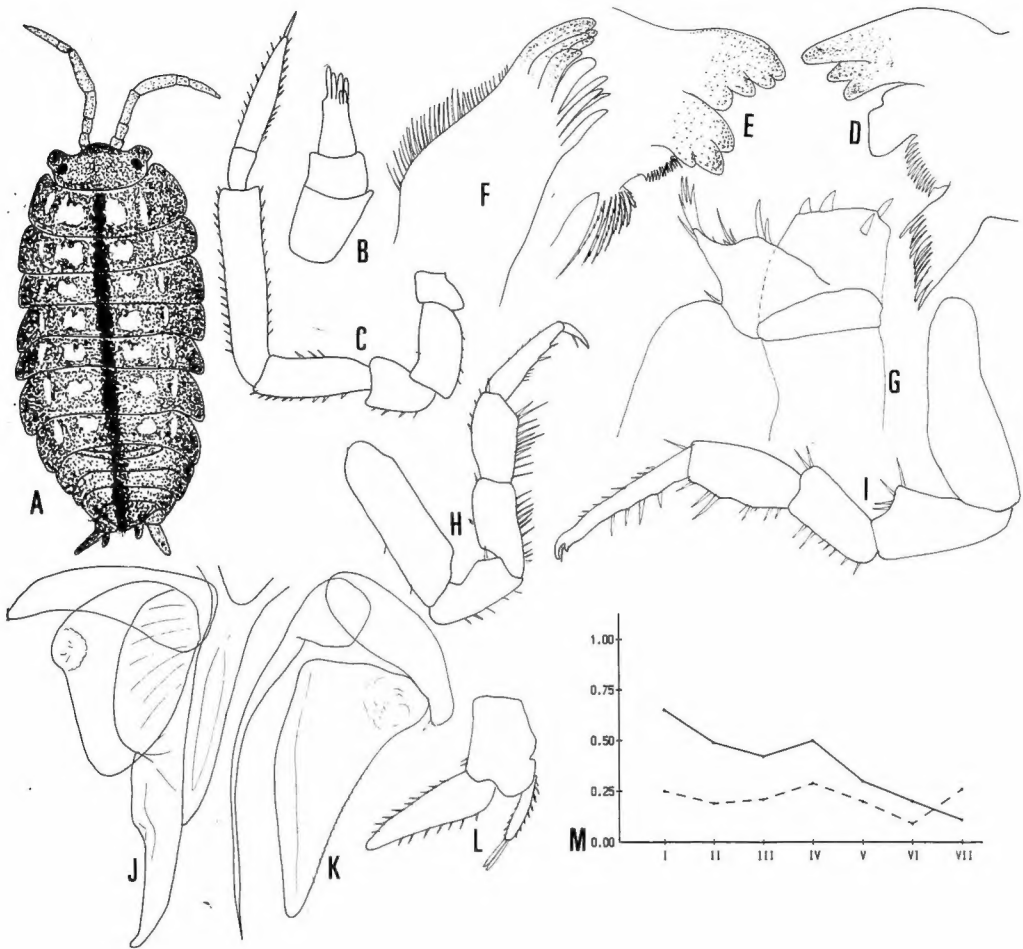


Fig.168 *Nagurus gotoensis* n. sp.

A. Dorsal view; B.First antenna; C.Second antenna; D.Right mandible E.Left mandible; F. Outer lobe of first maxilla; G. Maxilliped; H.First pereopod; I. Seventh pereopod; J.Penes and male first pleopod; K.Male second pleopod; L. Uropod ; M. Position of noduli lateralis, a full line shows b/c and a broken line shows d/c(All: Holotype male).

Male second pleopod(Fig.168 K); endopodite, narrow and long, exceeds exopodite; exopodite triangular without any concavity.

Uropod(Fig.168 L); basis square; endopodite narrow lanceolate; exopodite twice as long as endopodite.

Remarks : The present new species is most closely allied to *Nagurus vannamei*, known from Tokyo and Kumamoto, but the former is separated from the latter in the following

features: (1)shape of exopodite on male first pleopod,(2)position of noduli lateralis, (3)less numerous ocelli of eye, (4)entire teeth of exopodite of first maxilla, and (5)less protruded pleotelson.

***Nagurus nakadoriensis* n. sp.**

(Jap. name: Nakadôri-hayashi-warajimushi, new)

Figs.169

Material examined:1♂(holotype, 8.4 mm in body length), at the foot of the Ôgiyama, Narao-cho, Nakadôri-jima, Nagasaki Pref., coll. Noboru Nunomura, July 8, 1988 and 1♀ (allotype, 10.0 mm in body length), Yoneyama, Narao-cho, Nakadôri-jima, Nagasaki Pref., coll. Noboru Nunomura, July 9, 1988. Type series is deposited as follows: holotype(TOYA Cr-10846), allotype (TOYA Cr-10847) at the Toyama Science Museum.

Description : Body 2.0 times as long as wide. Body colour brown with paler irregular patterns. Body surface granulated. Cephalon with a low triangular medial process and a pair of well developed lateral projections. Eys mediocre in size and each eye composed of 20 ocelli. Each peraeonal somite subequal in length but the posterior 2 somites strongly recurved in both sides. Noduli lateralis on peraeonal somites 1, 5~7 are situated near the lateral margin, but noduli lateralis on peraeonal somites 2~4 are indistinct. Pleonal somites 1~2 short, pleonal somites 3~5 with distinct epimera. Pleotelson triangular without any concavity.

First antenna(Fig.169 B); first segment cylindrical with a protrusion at the distal margin; second segment short; terminal segment rectangular with 7~8 aesthetascs at the tip.

Second antenna(Fig.169 C) rather long, reaching the posterior part of the third peraeonal somites. Peduncle long, first segment small; second and third segments twice as long as wide; fourth segment exceeds 2.5 times as long as the third, fifth peduncular segment 1.5 times as long as the fourth. Flagellum 2-segmented and 0.8 time as long as the fifth peduncular segment; second segment 1.5 times as long as the first.

Right mandible(Fig.169 D); pars incisiva 2-headed; lacinia mobilis single-headed; 2 hairy bristles between lacinia mobilis and processus molaris, processus molaris is represented by a tuft of hairy bristles.

Left mandible(Fig.169 E); pars incisiva 3-headed; lacinia mobilis 3-headed; 3 hairy bristles between lacinia mobilis and processus molaris, processus molaris is represented by a tuft of hairy bristles.

First maxilla(Fig.169 F); outer lobe with 10 entire teeth.

Second maxilla(Fig.169 G) bilobed with wide dental area.

Maxilliped(Fig.169 H); endite stout with 3 strong spines; palp relatively long.

First peraeopod(Fig.169 I); basis oblong; ischium half the length of basis; merus rectangular with many long setae on inner margin; carpus slightly longer than merus with many long setae on inner margin; propodus with 5~6 setae on inner margin.

Seventh peraeopod(Fig.169 J); basis oblong; ischium with sternal margin; carpus a little shorter than ischium; carpus again as long as ischium; propodus with 8 longer and several shorter setae on inner margin.

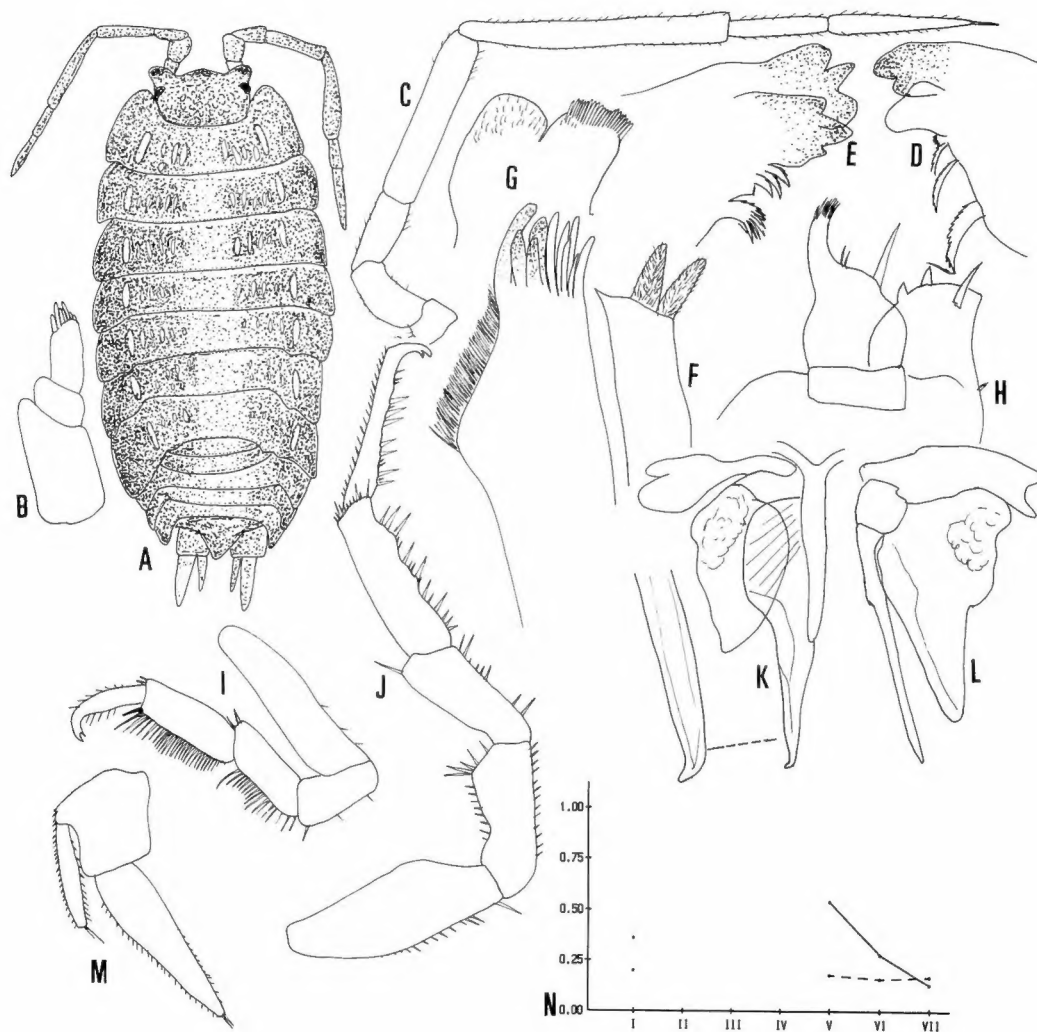


Fig.169. *Nagurus nakadoriensis* n. sp.

A. Dorsal view; B.First antenna; C.Second antenna; D.Right mandible; E.Left mandible; F. First maxilla; G.Second maxilla; H.Maxilliped; I.First peraeopod; J. Seventh peraeopod; K. Penes and male first pleopod; L.Male second pleopod; M. Uropod; N. Position of noduli lateralis, a full line shows b/c and a broken line shows d/c(All: Holotype male).

Penes(Fig. 169 K) narrow.

Male first pleopod(Fig.169 K); straight, apical part bents outerwards; exopodite egg-shaped, with slightly sinuate outer margin and with 3~4 minute denticles.

Male second pleopod(Fig.169 L); endopodite straight and slender, exopodite triangular.

Uropod(Fig.169 L); basis square; endopodite narrow; exopodite longer than endopodite.

Remarks : The present new species is most closely allied to *Nagurus kobarii* NUNOMURA reported from Kanto district, eastern Japan, but the former is separated from the latter in the following features: (1) bigger body size, (2) longer second antenna, (3) ratio of the length of two flagellar segments of second antenna, (4) absence of swollen part of carpus of male seventh peraeopod, (5) sinuate exopodite of male first pleopod, and (6) absence of noduli lateralis on the second to fourth peraeonal somites.

***Nagurus izuharaensis* n. sp.**

(Jap. name: Izuhara-hayashi-warajimushi, new)

Fig.170

Material examined : 1♂ (holotype, 4.7 mm in body length) and 1♀ (allotype, 5.6 mm in body length), Izuhara, Izuhara-cho, Shimoagata-gun, Tsushima Island, Nagasaki Pref., coll. Noboru Nunomura, July 5, 1988. Type series is deposited as follows: holotype (TOYA Cr-10848) and allotype (TOYA Cr-10849) at the Toyama Science Museum.

Description : Body 2.1 times as long as wide. Body colour brown with paler irregular patterns. Cephalon with a low medial projection. Eyes mediocre in size, each eye composed of 18 ocelli. Noduli lateralis on the peraeonal segments 1, 3, 5 are relatively remote from the lateral margin. Pleotelson low triangular.

First antenna(Fig.170 C) short; first and second segments very short; terminal segment with 5 aesthetascs.

Second antenna (Fig.170 D), reaching the posterior part of the second peraeonal somite. Mutual length of five peduncular segments is 1: 2: 3: 4: 7. Flagellum is 60% as long as the fifth peduncular segment. Terminal flagellar segment 1.9 times as long as the basal segment.

Right mandible(Fig.170 D); pars incisiva 3-headed; lacinia mobilis 3-toothed; processus molaris is represented by a tuft of hairy bristles.

Left mandible(Fig.170 E); pars incisiva 3-headed; lacinia mobilis 2-toothed; processus molaris is represented by a tuft of hairy bristles.

First maxilla(Fig.170 F); outer lobe stout, with 10(4+6) simple and robust teeth on the distal margin.

Second maxilla(Fig.170 G) pretty wide.

Maxilliped(Fig.170 H); endite rounded rectangular with 3 stout spines on distal margin; palp short and narrow.

First peraeopod(Fig.170 I); basis oblong; ischium; merus rectangular with 13~14 setae on inner margin; carpus a little longer than merus with 20 setae on inner margin; propodus long

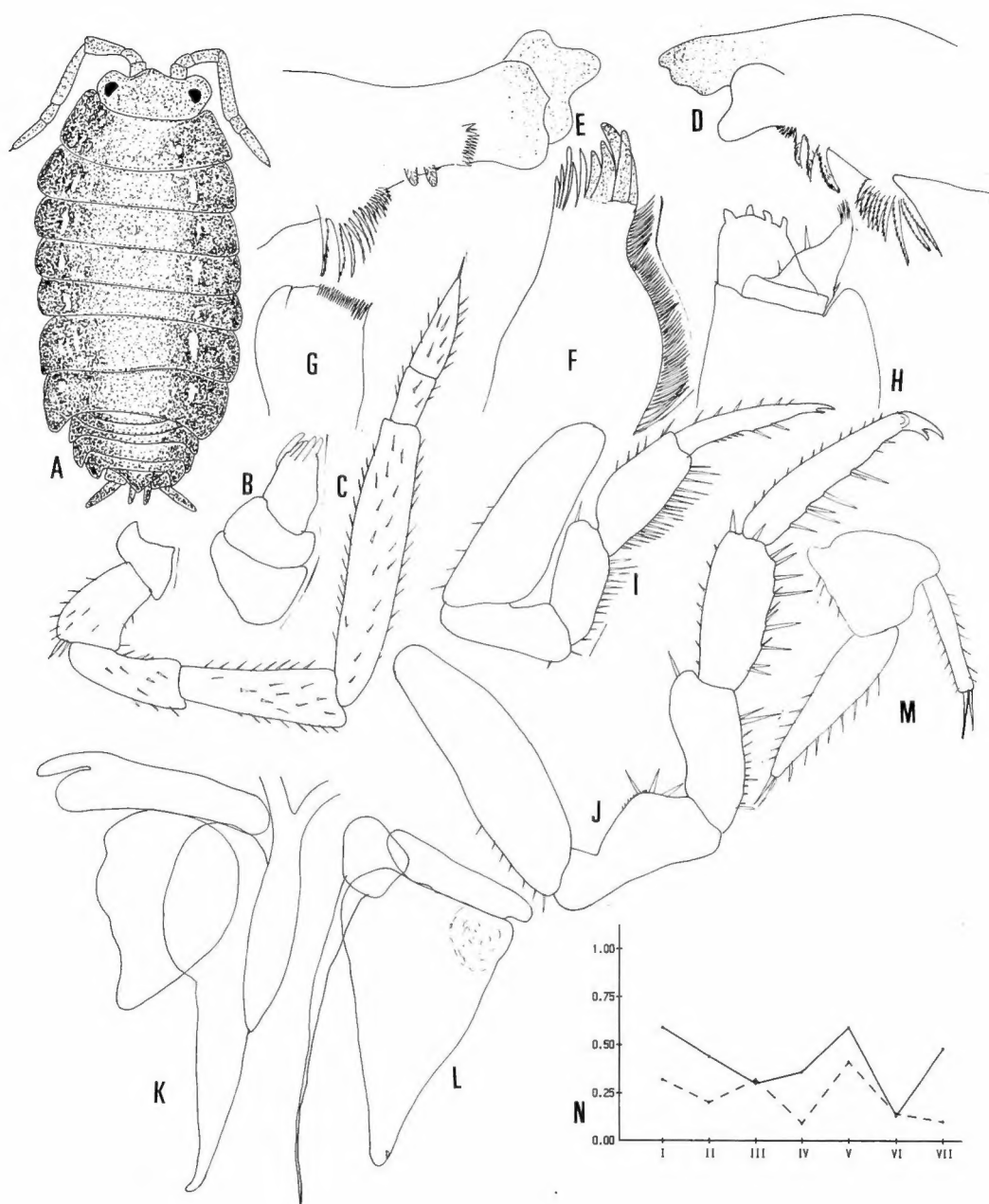


Fig.170 *Nagurus izuharaensis* n. sp.

A.Dorsal view; B. First antenna; C. Second antenna; D.Right mandible; E.Left mandible; F.Outer lobe of first maxilla; G.Second maxilla; H.Maxilliped; I. First pereopod; J.Seventh pereopod; K.Penes and male first pleopod; L.Endopodite of male second pleopod; M.Uropods; N.Position of noduli lateralis, a full line shows b/c and a broken line shows d/c(All: Holotype male).

with a series of short setae on the basal part of inner margin and 2 longer setae on the distal half of the same.

Seventh peraeopod(Fig.170 J); basis oblong; ischium triangular with 3 setae at the sternal margin; merus and ischium rectangular with 9 setae on inner margin; carpus as long as merus and with many setae; propodus oblong with 5 long and 5~6 short setae on inner margin.

Penes(Fig.170 K) fusiform.

Male first pleopod(Fig.170 K); exopodite ellipsose with somewhat sinuate on outer margin; endopodite straight, apical part bends outerwards.

Male second pleopod(Fig.170 L); exopodite triangular without any conspicuous concavity; endopodite straight and slender.

Uropod(Fig.170 M); basis trapezium in shape; endopodite narrow, exopodite stout and slightly longer than endopodite.

Remarks : The present new species is most closely allied to *Nagurus lineatus* NUNOMURA reported from Bonin Islands, but the former is separated from the latter in the following features:(1)absence of longitudinal colour patterns,(2)shorter pleotelson, (3) shorter first antenna, longer uropods. The present new species is allied to *N.tokunoshimaensis* NUNOMURA reported from Tokunoshima, Amamami Islands, in the shape of exopodite of male first pleopod, but differs from *tokunoshimaensis* in the following features: (1)concave margin of first peraeonal somite, (2)bigger eyes, (3)ratio of two flagellar segments of second antenna, (4) position of noduli lateralis, and (5)blackish body colour.

***Nagurus pallidus* n. sp.**

(Jap. name: Shiro-tsushima-warajimushi, new)

Fig.171

Material examined : 1♂(holotype, 7.3 mm in body length), Kechi, Mitsushima-cho, Shimoagata-gun, Tsushima Island, Nagasaki Pref. coll. Noboru Nunomura, May 26, 1988. Holotype is deposited at the Toyama Science Museum (TOYA Cr-10850).

Description : Body oval, 2.1 times as long as wide. Body colour pure white. Body surface with a low tubercles. Cephalon with a poorly developed lateral lobes and a low triangular medial process. Eyes mediocre in size and each eye composed of 26 ocelli. Each peraeonal somite subequal in length. Pleotelson triangular without any concavity on both sides.

First antenna(Fig.171 B); first segment almost square, second segment slightly smaller than the first; terminal segment short with 6 small aesthetascs.

Second antenna(Fig.171 C), reaching the anterior margin of the second peraeonal somite. Flagellum 80% as long as the fifth peduncular segment; second segment 1.5 times as long as the first.

Right mandible(Fig.171 D); pars incisiva 2-headed; lacinia mobilis small with a very shallow concavity; 2 hairy bristles between lacinia mobilis and processus molaris; processus molairs is represented by a tuft of hairy bristles.

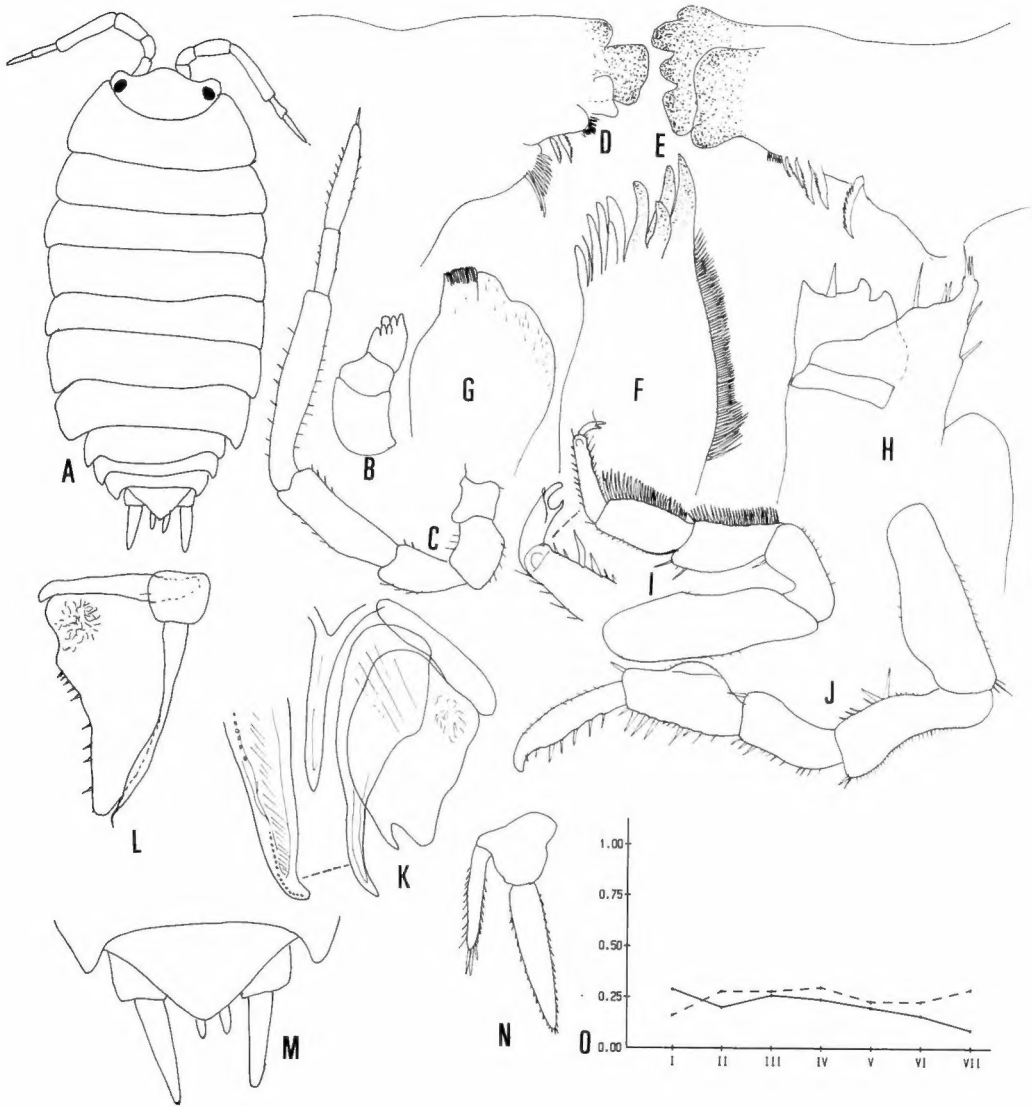


Fig.171 *Nagurus pallidus* n. sp.

A.Dorsal view; B. First antenna; C.Second antenna; D.Right mandible; E.Left mandible; F.Outer lobe of first maxilla; G.Second maxilla; H.Maxilliped; I. First pereopod; J.Seventh pereopod; K.Penes and male first pleopod; L.Male second pleopod; M. Pleotelson and uropods; N.Uropod; O.Position of noduli lateralis, a full line shows b/c and a broken line shows d/c(All: Holotype male).

Left mandible(Fig.171 E); pars incisiva 4-headed: lacinia mobilis with a very shallow concavity; 4 hairy bristles between lacinia mobilis and processus molaris; processus molaris

is represented a relatively big hairy bristle.

First maxilla(Fig.171 F); outer lobe with 10 (4+6) simple setae.

Second maxilla(Fig.171 G); dental part relatively narrow.

Maxilliped(Fig.171 H); endite wide with 3 stout spines and a big seta; palp rather short.

First peraeopod(Fig.171 I); basis long; ischium half the length of basis; merus and carpus rectangular with many setae on inner margin; propodus rather short.

Seventh peraeopod(Fig.171 J); basis rectangular; ischium long with a seta on inner margin; merus 2/3 time as long as ischium; carpus rectangular with a swollen part on outer margin and about 10 strong teeth on inner margin; propodus with 6~7 setae on inner margin.

Penes (Fig.171 K) narrow.

Male first pleopod(Fig.171 K); endopodite narrow, apex bents outerwards slightly; exopodite ovate with a relatively deep concavity.

Male second pleopod(Fig.171 L); endopodite straight and apical part very thin; exopodite triangular with 10 denticles on outer margin.

Uropod(Fig.171 M, N); basis trapezium in shape; endopodite narrow with many setae; exopodite rather stout.

Habitat : This specimen was collected at the grass near the road side together with *Nagurus sakimori* NUNOMURA.

Remarks :The present new species resembles very closely allied to *Nagurus tsushimaensis* NUNOMURA 1987, collected from Tsushima-Shimoshima but the former is separated from the latter in the following features:(1)white body and (2) longer endopodite of male first pleopod.

Family Armadillidae BRANDT & RATZENDURG, 1831

Genus *Sphaerillo* VERHOEFF, 1926

19 species of the genus *Sphaerillo* have been recorded as valid in Japan, including 7 new species.

Key to the Japanese species of the Genus *Sphaerillo*.

- 1 Body colour blackish with paler patterns.....2
- 1' Body colour pale yellow or whitish with or without darker blackish or brown patterns12
- 2 Pleotelson without any remarkable concavities in the lateral margin (even if it existed, it is less than 10%)3
- 2' Pleotelson hour glass-shaped, with remarkable concavities in the lateral margin, its depth exceeds more than 10% in depth.....6
- 3 Marginal border black in colour. Exopodite of male first pleopod round4
- 3' Marginal border white in colour. Exopodite of male first pleopod triangular*S.elegans* NUNOMURA.

- 4 Eye mediocre, each eye composed of more than 15 ocelli. Exopodite of male first pleopod relatively stout, more than 60% as long as wide.....*S.obsculus* BUDDÉ-LUND
- 4' Eye small, each eye composed of less than 12 ocelli. Exopodite of male first pleopod pleopod relatively narrow, less than 60 % as long as wide.....5
- 5 Exopodite of male second pleopod long and exceeds endopodite. First antenna with aesthetascs*S. hiurai* n. sp.
- 5' Exopodite of male second pleopod relatively short, not exceeds endopodite. First antenna without aesthetascs*S.kunigamiensis* n. sp.
- 6 Body not so convex.Body colour almost uniformly black, with several rows of narrow paler longitudinal patterns*S.iriomotensis* NUNOMURA
- 6' Body rather convex. Body with rather wide paler irregular patterns.....7
- 7 Terminal flagellar segment of the second antennae more than 3 times longer than the first segment8
- 7' Terminal flagellar segment of the second antennae less than 3 times longer than the first segment10
- 8 Pleon with transverse dark line*S.zonalis* n. sp.
- 8' Pleon without transverse dark line.....9
- 9 Endopodite of male first pleopod with sole-like structures at the tip. Exopodite of the same ellipso-shaped*S.soleiformis* n.sp.
- 9' Endopodite of male first pleopod without any characteristic structure at the tip
- 9'' Exopodite of the same triangular*S.dorsalis* (IWAMOTO)
- 10 Exopodite of male second pleopod longer than endopodite*S.daitoensis* NUNOMURA
- 10' Exopodite of male second pleopod shorter than endopodite*S.hasegawai* n.sp.
- 10'' Exopodite of male second pleopod almost as long as endopodite11
- 11 Absence of tridentate setae on peraeopod*S.boninensis* NUNOMURA
- 11' Presence of tridentate setae on peraeopod*S. tomiyamai* n. sp.
- 12 Body colour without any pigment*S. albus* NUNOMURA
- 12' Body colour with many irregular black patterns13
- 13 Peraeonal somites with longitudinal black patterns14
- 13' Peraeonal somites with transverse black patterns on each distal part
.....*S.lineatus* NUNOMURA
- 14 Hind part of pleotelson almost straight15
- 14' Hind part of pleotelson rounded16
- 15 Terminal segment of flagellum more than 3.5 times longer than the first segment
.....*S. russoi* (ARCANGELI)
- 15' Terminal segment of flagellum less than 3 times longer than the first segment
.....*S.yonakuniensis* NUNOMURA.
- 16 Pleotelson almost as long as wide. Propodus of first peraeopod longer than carpus...17

- 16' Pleotelson obviously not so long as wide. Propodus of first peraeopod shorter than carpus*S.yaeyamanus* NUNOMURA
 17 Medial pair of longitudinal darker row near each other*S.shuriensis* NUNOMURA
 17' Medial pair of longitudinal darker row apart each other.....*S.agataensis* n. sp.

***Sphaerillo hiurai* n. sp.**

(Jap. name: Hiura-koshibiro-dangomushi, new)

Fig. 172

Material examined : 2♂♂ (1♂ holotype, 5.4 mm in body length and 1♂ paratype, 5.6 mm in body length) and 7♀♀ (1♀ allotype, 6.9 mm in body length and 6♀♀ paratypes 5.2~7.3mm in body length), Temple Bannshōin, Izuhara-cho, Shimoagata-gun, Tsushima Island, Nagasaki Pref., coll. Isamu Hiura, June 6, 1974. Type series is deposited as follows: holotype (TOYA Cr-10851), allotype (TOYA Cr-10582) and 3 paratypes (TOYA Cr-10853~10855) at the Toyama Science Museum and, 4 paratypes (OMNH Ar-3467~3470) at the Osaka Museum of Natural History.

Description : Body 2.2 times as long as wide. Body colour black with irregular paler patterns. Eyes mediocre in size, each eye composed of 11~12 ocelli. Pleotelson rounded with a pair of concavities on lateral margin; distal margin round.

First antenna (Fig. 172 C); first segment rectangular; second segment short; terminal segment rectangular with 4 aesthetascs at the tip.

Second antenna (Fig. 172 D) rather short, reaching the anterior part of the first peraeonal somite. Mutual length of the 5 peduncular segments is 1: 2: 2: 3: 3.3. Flagellum is as long as the fourth peduncular segment; terminal segment 2.5 times as long as the first.

Right mandible (Fig. 172 E); pars incisiva weakly 2-headed; lacinia mobilis thin and single-toothed; a bristle behind lacinia mobilis; processus molaris is represented by a single hairy bristle.

Left mandible (Fig. 172 F); processus molaris strongly 3-headed; lacinia mobilis is also 3-headed; 2 hairy bristles behind lacinia mobilis; processus molaris is represented by a single hairy bristle.

First maxilla (Fig. 172 G); outer lobe with 10(4+6) teeth at the tip; inner lobe with 2 plumose setae.

Second maxilla (Fig. 172 H) rather wide.

Maxilliped (Fig. 172 I); endite rectangular with 4 stout spines on the distal end; palp relatively wide.

First peraeopod (Fig. 172 J); basis oblong; ischium half as long as basis; merus almost as long as ischium; carpus a little longer than ischium, with a dozen setae on inner margin; propodus almost as long as carpus.

Seventh peraeopod (Fig. 172 K); basis oblong; ischium elongated triangular; merus almost as long as ischium; carpus a little longer than ischium, with many short setae on inner margin;

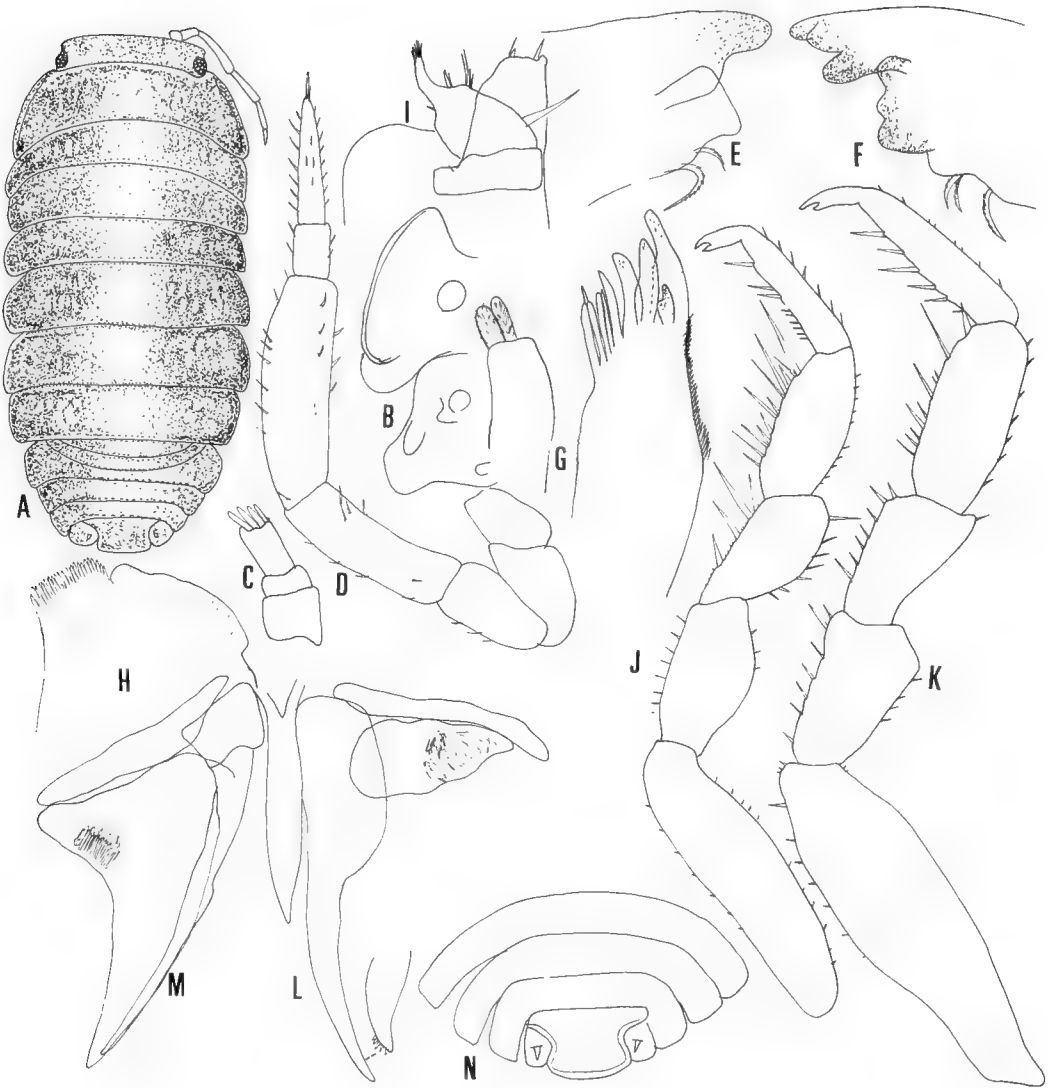


Fig.172 *Sphaerillo hiurai* n. sp.

A.Dorsal view; B.Ventral view of first and second pereopodal somites; C.First antenna; D.Second antenna; E.Right mandible; F.Left mandible; G. First maxilliped; H.Second maxilla; I.Maxilliped; J. First pereopod; K.Seventh pereopod; L.Penes and male first pleopod; M.Male second pleopod; N. Pleotelson and uropods (All: Holotype male).

propodus as long as carpus.

Penes(Fig.172 L) narrow and straight.

Male first pleopod(Fig.172 L); exopodite short and almost triangular; endopodite straight only slightly bends outwards without any denticles at the distal end.

Male second pleopod(Fig.172 M); exopodite triangular with a rectangular concavity on outer margin; endopodite exceeds only slightly beyond the exopodite.

A gravid female with 15 eggs in her brood pouches.

Remarks : The present new species is very closely allied to *Sphaerillo obsculus* BUDDE-LUND reported from the eastern Japan but the former is separated from the latter in the following features: (1)longer exopodite of male first pleopod, (2)less numerous spines on the tip of endopodite of male first pleopod, (3)smaller eyes and less numerous ocelli, (4)stronger concavities of pleotelson, and (5)acute edge of exopodite of male second pleopod.

***Sphaerillo kunigamiensis* n. sp.**

(Jap. name:Yanbaru-koshihiro-dangomsohi, new)

Fig.173

Material examined :1♂(holotype, 7.4mm in body length), Terukubi-yama Kunigami-son, Okinawa Island, coll.Yoshiaki Nishikawa, Oct. 21, 1987: 1♂(paratype, 6.3 mm in body length), Terukubi-yama, Kunigami-son, Okinawa Pref., coll. Yoshiaki Nishikawa, Oct, 23,1987. Type series is deposited as follows: holotype(TOYA Cr-10875)and a paratype (TOYA Cr-10876) at the Toyama Science Museum.

Description : Body convex, 2.0 times as long as wide. Body colour grayish brown with many paler irregular patterns. Cephalon rectangular with a slightly protruded anterolateral projections. Eyes relatively small, each eye composed of 10 ocelli. First peraeonal somite with a pair of schisma which continue to a groove. Second peraeonal somite with a tooth. Pleotelson hour glass-shaped, distal end slightly rounded.

First antenna(Fig.173 C) three-segmented; each segment subequal in length ; terminal segment with a small aesthetasc at the tip.

Second antenna(Fig.173 D); first segment square; second segment about twice as long as the first; third segment 3/4 time as long as the second; fourth segment 1.5 times as long as the third; fifth segment a little longer than the fourth. Flagellum as long as the fourth peduncular segment; terminal flagellar segment 3.5 times as long as the basal one.

Right mandible(Fig.173 E); pars incisiva 2-headed; lacinia mobilis single-toothed; 2 hairy bristles behind lacinia mobilis; processus molaris is represented by a single hairy bristle.

Left mandible(Fig.173 F); pars incisiva 3-headed; lacinia mobilis single-toothed; 2 hairy bristle behind lacinia mobilis; processus molaris is represented by a single hairy bristle.

First maxilla(Fig.173 G); outer lobe with 10 (4+6) simple teeth, the outermost hairy bristle.

Second maxilla(Fig.173 H); rather narrow.

Maxilliped(Fig.173 I); endite rectangular with 3 stout spines; palp with stout basal half and distal half very slender.



Fig.173 *Sphaerillo kunigamiensis* n. sp.

A.Dorsal view of anterior part of body; B.Ventral view of first and second pereopodal somites; C.First antenna; D.Second antenna; E.Right mandible; F.Left mandible; G. Outer lobe of first maxilla; H.Second maxilla; I.Maxilliped; J.First pereopod; K. Seventh pereopod; L.Penes and male first pleopod; M.Male second pleopod;N. Pleotelson and uropods (All: Holotype male).

First pereopod(Fig.173 J); basis oblong; ischium rectangular, half as long as basis; carpus almost square and as long as merus; carpus a little longer than carpus, with 3 long setae on inner margin; propouids rectangular with 11 smaller setae and 3 bigger setae on distal half of inner margin.

Seventh peraeopod(Fig.173 K); basis oblong; ischium rectangular with many setae on inner margin; carpus rectangular, 1.5 times as long as merus with 2 longer and several small setae on inner margin; propodus as long as carpus.

Penes(Fig.173 L) stout and fusiform.

Male first pleopod(Fig.173 L); exopodite triangular; endopodite straight with more than 13 spines on inner distal margin.

Male second pleopod(Fig.173 M); exopodite with sinuate margin; endopodite long and exceeds far beyond the exopodite.

Remarks : The present new species is most closely allied to *S.obsculus* BUDDE-LUND, but the former is separated from the latter in the following features:(1)shape of exopodite of male first pleopod, (2)sinuate margin of exopodite of male second pleopod, (3) longer endopodite of male second pleopod, and (4)smaller eyes.

***Sphaerillo zonalis* n. sp.**

(Jap. name:Yokosuji-koshibiro-dangomushi, new)

Fig.174

Material examined : 1 ♀ (holotype, 10.4 mm in body length), Danjo Island, coll. Masao Ejima, May 25, 1989; 1 ♂ (allotype, 7.3 mm in body length) from the alimentary canal of the salamander, *Hynobius nebulosus nebulosus*, collected from Danjo island coll. Masao Ejima, 1989. Type series is deposited as follows: holotype(TOYA-Cr-10877) and allotype (TOYA Cr-10878) at the Toyama Science Museum.

Description : Body convex, 2.2 times as long as wide. Body colour brown with paler irregular patterns. Cephalon rectangular, anterior border straight. Eyes relatively small, each eye composed of 10 ocelli. Hind lateral corner of first peraeonal somite with a lateral margin grooved; hind corner of epimera of second peraeonal somite with a pair of acute teeth. Each pleonal somite with a transverse dark line. Pleotelson long.

First antenna(Fig.174 C); first segment rectangular; second segment about half the length of the first; terminal segment round with 8 aesthetascs at the tip.

Second antenna(Fig.174 D), reaching a middle part of the first peraeonal somite; first segment small; second and third segments rectangular and subequal in length; fourth segment 1.5 times as long as the third; fifth segment 1.3 times as long as the fourth; flagellum half the length of the fifth peduncular segment. Terminal segment 3.5 times as long as the first

Right mandible(Fig.174 E); pars incisiva weakly 3-headed; lacinia mobilis single-toothed; 2 hairy bristles behind lacinia mobilis; processus molaris is represented by a long hairy bristle.

Left mandible(Fig.174 F); pars incisiva weakly 3-headed; lacinia mobilis weakly 4-toothed; 2 hairy bristles behind lacinia mobilis; processus molaris is represented by a tuft of hairy bristles.

First maxilla(Fig.174 G); outer lobe with 10(4+6) simple setae; inner lobe with 2 brush-like setae.

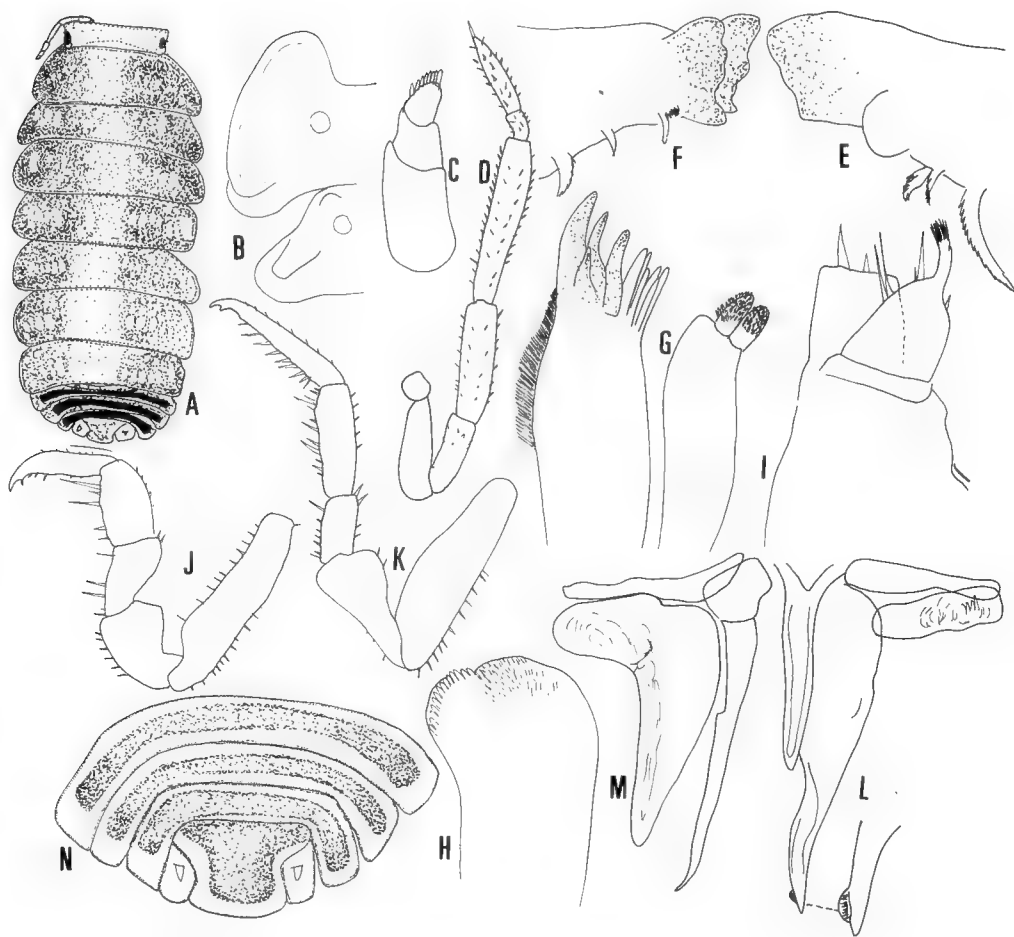


Fig.174 *Sphaerillo zonalis* n. sp.

A.Dorsal view; B.Ventral view of first and second pereopodal somites; C.First antenna; D.Second antenna; E.Right mandible; F.Left mandible; G.First maxilla; H.Second maxilla; I.Maxilliped; J.First pereopod; K.Seventh pereopod; L.Penes and male first pleopod; M.Male second pleopod; N.Pleotelson and uropods (All: Holotype male).

Second maxilla(Fig.174 H) normal.

Maxilliped(Fig. 174 I); endite rectangular with 2 spines on the distal end; palp stout.

First pereopod(Fig.174 J); basis oblong; ischium rectangular with a sternal margin ; merus and ischium rectangular; propodus as long as carpus.

Seventh pereopod(Fig.174 K); basis rectangular with 10 short setae on inner margin; ischium rectangular and spreads towards the distal margin; merus short, about half as long

as ischium; carpus as long as ischium; propodus a little longer than carpus, with 9 setae on inner margin.

Penes(Fig. 174 L) straight.

Male first pleopod(Fig. 174 L); exopodite narrow and ellipsoid; endopodite straight, apical part with 8 denticles near the tip.

Male second pleopod(Fig.174 M); exopodite triangular with a shallow but wide concavity on outer margin; endopodite a little longer than the exopodite.

Remarks : The present new species is most closely allied to *S. dorsalis* (IWAMOTO) but the former is separated from the latter in the following features: (1)transverse colour pattern on pleonal somites, (2) longer pleotelson, (3) more numerous aesthetascs of first antenna, (4) presence of the lappet-like structure on endopodite of male first pleopod, and (5) more depressed exopodite of male first pleopod.

***Sphaerillo tomiyamai* n. sp.**

(Jap. name: Tomiyama-koshibiro-dangomushi, new)

Fig.175

Material examined : 1♂(holotype, 4.5 mm in body length) and 4♀ (1♀ allotype, 9.1 mm in body length and 3♀ paratypes, 4.5~6.1 mm in body length), Nakôdori-jima,. coll. Kiyonori Tomiyama, July, 20, 1990. Type series is deposited as follows: Holotype(TOYA-Cr-10856), allotype(TOYA-Cr 10857) and 2 paratype(TOYA Cr-10858~10859) at the Toyama Science Museum, a paratypes (OMNH Ar- 3471) at the Osaka Museum of Natural History.

Description : Body colour black with irregular paler patterns. Eyes mediocre in size, each eye composed of 10 ocelli. Hind lateral margin of first peraeonal somite grooved. Second peraeonal somite with a pair of small teeth. Pleotelson with a pair of lateral concavities, distal margin rounded.

First antenna(Fig.175 C); first segment almost square; second segment rectangular; third segment slender with 6 aesthetascs at the tip.

Second antenna(Fig.175 D), reaching the anterior part of the first peraeonal somite; mutual length of first to fifth peduncular segments is 1: 2: 2: 2: 3. Flagellum is about 72 % as long as the fifth peduncular segment; terminal segment 3 times as long as the basal one.

Right mandible(Fig.175 E); pars incisiva 4-headed; lacinia mobilis single-toothed; 2 hairy bristles between lacinia mobilis and processus molaris; procesus molaris is represented by a single hairy bristle.

Left mandible(Fig.175 F); pars incisiva chitinized 3-headed; lacinia mobilis chitinized and weakly 2-headed; 3 hairy bristles between lacinia mobilis and processus molaris; processus molaris is represented by a single hairy bristle.

First maxilla(Fig.175 G); outer lobe with 10(4+6) teeth at the tip; inner lobe with 2 stout hairy bristles at the tip.

Second maxilla (Fig.175 H) normal.

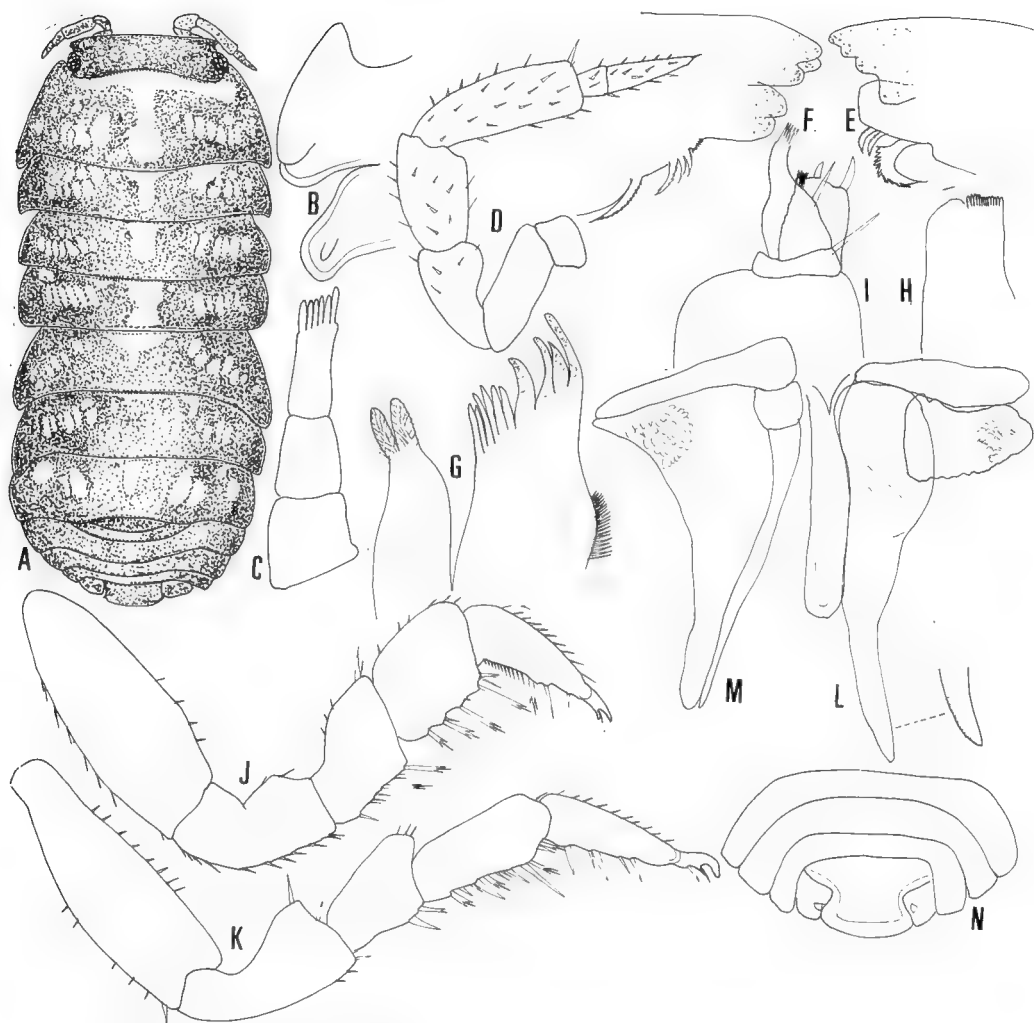


Fig.175 *Sphaerillo tomiyamai* n. sp.

A.Dorsal view; B.Ventral view of first and second pereopodal somites; C.First antenna; D.Second antenna; E.Right mandible; F.Left mandible; G.First maxilla; H. Second maxilla; I.Maxilliped; J.First pereopod; K.Seventh pereopod; L.Male first pleopod; M. Male second pleopod; N.Pleotelson and uropods (All: Holotype male).

Maxilliped(Fig.175 I); endite rectangular with 2 spines at the distal margin; palp rather stout with a bundle of long setae at the tip and a long seta and a group of setae on inner margin.

First pereopod(Fig.175 J); basis oblong; ischium about half the length of basis with a series of short setae on inner margin; merus square with tridentate long setae and some simple short setae on inner margin; carpus square with 4 long tridentate setae on inner margin; propodus a series of short setae on basal half and 3 long setae distal half of on inner margin.

Seventh peraeopod(Fig.175 K); basis oblong; ischium becomes wider towards the distal end; merus rectangular, half the length of ischium; carpus square with a dozen setae on inner margin, some of which are tridentate type; propodus with 5 stout setae on inner margin.

Penes(Fig.175 L) rectangular.

Male first pleopod(Fig.175 L); endopodite straight with 20 minute setae; exopodite rectangular.

Male second pleopod(Fig.175 M); endopodite rather short; exopodite elongated triangular, almost as long as endopodite.

Remarks: The present new species is most closely allied to *S.boninensis* NUNOMURA, but the former is separated from the latter in the following features: (1) rectangular exopodite of male first pleopod, (2) shape of penes, (3) tridentate setae on the peraeopods, and (4) more numerous aesthetascs at the tip of first antenna.

***Sphaerillo soleiformis* n. sp.**

(Jap. name: Kutsuzoko-koshibiro-dangomushi, new)

Fig.176

Material examined:1♂(holotype, 7.1 mm in body length), On the foot of Mt.Yoneyama, Narao-cho, Nakadôri jima, Nagasaki Pref. coll. Noboru Nunomura, July 9, 1988. Holotype is deposited at the Toyama Science Museum (TOYA-Cr-10860).

Description: Body 2.0 times as long as wide. Body colour black with many paler irregular patternes on dorsal surface. Eyes mediocre in size, each eye composed of 16 ocelli. Hind lateral margin of first peraeonal somite grooved. Second peraeonal somite with a pair of small teeth. Pleotelson hour glass-shaped with lateral concavity and long hind margin.

First antenna(Fig.176 C); terminal segment with 8 aesthetascs at the tip.

Second antenna(Fig.176 D) short, reaching the middle part of the first peraeonal somite, mutual length of first to fifth peduncular segments is 1: 3: 3: 4: 5. Flagellum is as long as the fourth peduncular segment, terminal segment 4 times as long as the basal one.

Right mandible(Fig. 176 E); pars incisiva single-toothed; lacinia mobilis almost single-toothed; 2 hairy bristles behind lacinia mobilis; processus molaris is represented by a hairy bristle.

Left mandible(Fig.176 F); pars incisiva single-toothed; lacinia mobilis almost single-toothed; 3 hairy bristles behind lacinia mobilis; processus molaris is represented by a single seta.

First maxilla(Fig.176 G); outer lobe with 10 (4+6) teeth at the tip; inner lobe with 2 hairy bristles and a protruded tip.

Second maxilla (Fig.176 H) normal, dental part narrow.

Maxilliped(Fig.176 I); endite rather wide and rectangular with 2 stout spines and 2 protuberances; palp rather narrow with a group of setae at the tip.

First peraeopod(Fig.176 J); basis oblong; ischium triangular; merus triangular; carpus

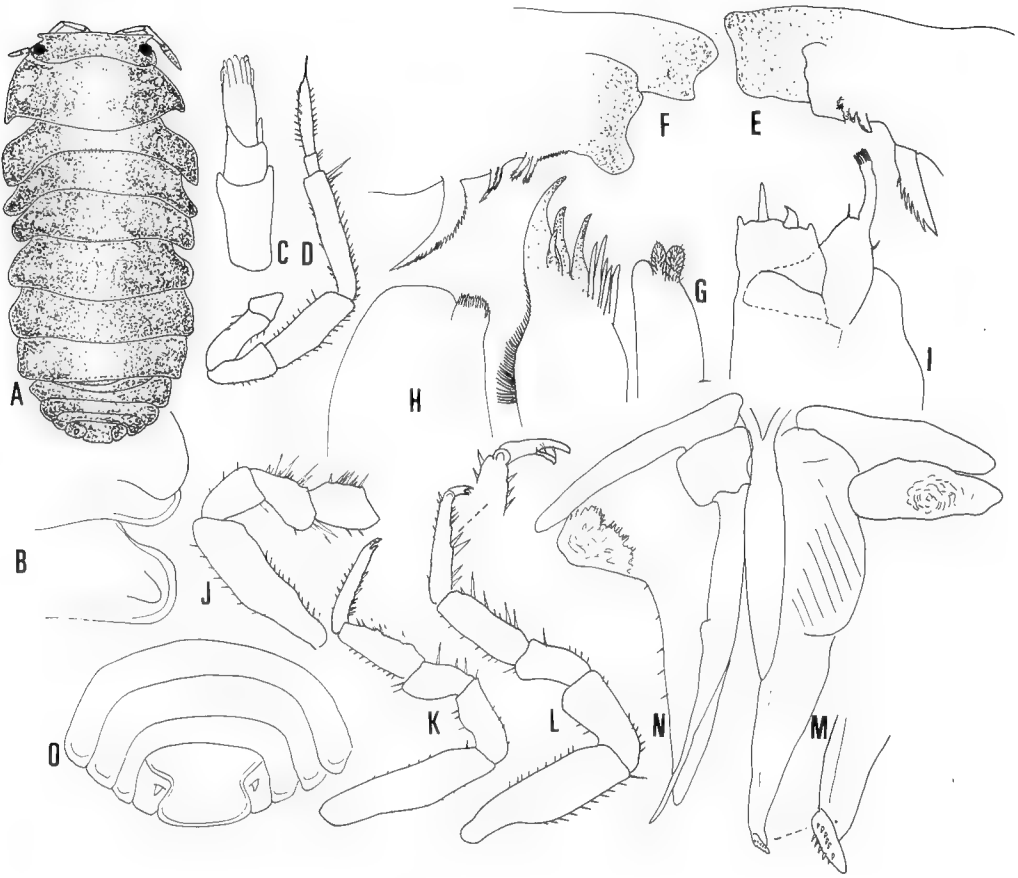


Fig.176 *Sphaerillo soleiformis* n. sp.

A.Dorsal view; B.Ventral view of first and second pereopodal somites; C.Second antenna; D.Left mandible; E.First maxilla; F.Left mandible; G.First maxilla; H. Second maxilla I.Maxilliped; J.First pereopod; K.Second pereopod; L.Seventh pereopod; M.Penes and male first pleopod; N.Male second pleopod; O.Pleotelson and uropod (All: Holotype male).

rectangular twice as long as wide. Unfortunately, propodus and dactylus are missing in the present specimen.

Second pereopod(Fig.176 K); basis oblong; ischium rectangular and about half the length of basis; merus rectangular but shorter than merus with 4 long setae on inner margin; carpus as long as ischium with 6 setae on inner margin; propodus slender with 7~8 setae on inner margin.

Seventh pereopod(Fig.176 L); basis oblong; ischium rectangular; merus rectangular; carpus as long as ischium; propodus relatively short with 4~5 setae.

Penes(Fig.176 M) narrow and fusiform.

Male first pleopod(Fig. 176 M) straight, with a sole-like structure with about 2 rows of 5 spines; exopodite ellipse.

Male second pleopod(Fig. 176 N); endopodite long; exopodite elongated and with a pointed tip.

Remarks : The present new species is separated from the all the members in having characteristic structures at the tip of endopodite of male first pleopod. Within the genus *Sphaerillo*, the present new species is allied to *Sphaerillo dorsalis* (IWAMOTO) but the former is separated from the latter in the following features: (1)shape of endopodite of male first pleopod, (2)ellipse exopodite of male first pleopod, (3) slenderer second antenna, and (4) more numerous aesthetascs of first antenna.

***Sphaerillo agataensis* n. sp.**

(Jap. name: Agata-koshibiro-dangomushi, new)

Fig.177

Material examined: 3♂♂ (1♂ holotype, 5.0 mm in body length and 2♂♂ paratypes 4.8 mm ~ 5.0 mm in body length) and 5♀♀ (allotype, 7.1 mm in body length and 6♀♀ paratypes, 5.2~7.2 mm in body length), Sasuna, Kamiagata-gun, Tsushima Island, Nagasaki-Pref., coll. Noboru Nunomura, July 4, 1988. Type series is deposited as follows: Holotype(TOYA Cr-10866), allotype(TOYA Cr-10867) and 5 paratypes(TOYA Cr-10868 ~10872) at the Toyama Science Museum, a paratypes (OMNH Ar-3472) at the Osaka Museum of Natural History.

Description: Body 2.1 times as long as wide. Body size reaches 7.1 mm in length. Body colour brown with 4 rows of darker lines in alcohol. Eyes mediocre, each eye composed of 15~16 ocelli. Hind lateral margin of first peraeonal somite grooved. Second peraeonal somite with a pair of small teeth. Pleotelson long, 1.2 times as long as wide, lateral margin with slightly shallow concavities, distal margin slightly rounded.

First antenna(Fig.177 C); first segment wide; second almost square; terminal segment conical with 3 aesthetascs.

Second antenna(Fig.177 D), reaching anterior part of first peraeonal somite, mutual length of 5 peduncular segment is 1: 3: 3: 5: 6. Flagellum a little shorter than the fifth peduncular segment, second segment 3.5 times as long as the first.

Right mandible(Fig. 177 E); pars incisiva 3-headed; lacinia mobilis single-toothed; 3 hairy bristles behind lacinia mobilis; processus molaris is represented by a single hairy bristle.

Left mandible(Fig.177 F); pars incisiva 3-headed; lacinia mobilis 3-headed; 3 hairy bristles behind lacinia mobilis; processus molaris is represented by a single hairy bristle.

First maxilla(Fig.177 G); outer lobe with 10 entire teeth, outer 4 teeth are stouter.

Second maxilla (Fig. 177 H) normal.

Maxilliped(Fig.177 I); endite rectangular with 3 stout spines; palp rather stout with 6

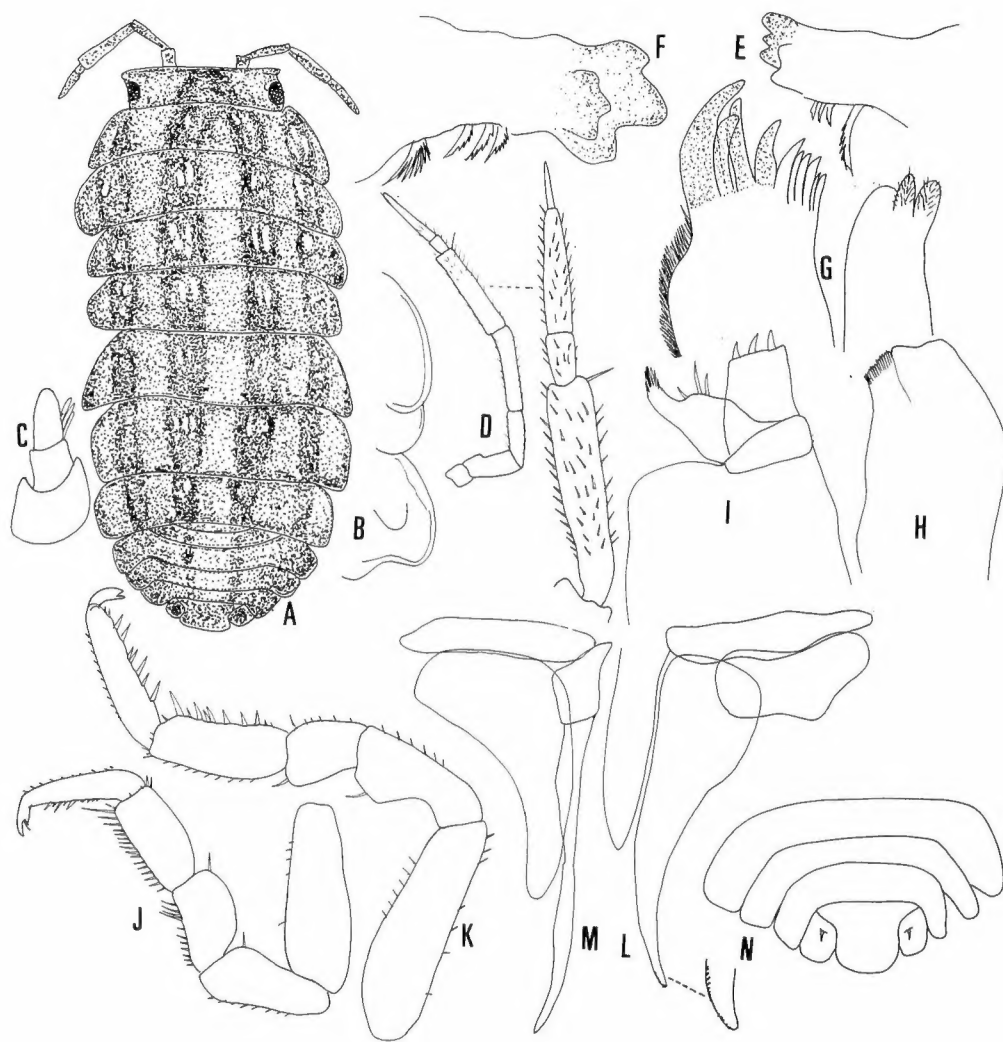


Fig.177 *Spaherillo agataensis* n. sp.

A.Dorsal view; B. Ventral view of first and second pereopodal somites; C.First antenna; D.Second antenna; E.Right mandible; F. Left mandible; G.First maxilla; H. Second maxilla; I.Maxilliped; J.First pereopod; K.Seventh pereopod; L.Penes and male first pleopod; M.Male second pleopod; N.Pleotelson and uropods (All: Holotype male).

setae at the tep.

First pereopod(Fig.177 J); basis oblong; ischium 40% as long as basis; merus $2/3$ time as long as ischium; carpus a little longer than ischium, with 4 long setae on inner margin;

propouids almost as long as carpus.

Seventh peraeopod(Fig.177 K); basis oblong; ischium elongated triangular; merus a little shorter than ischium; carpus a little longer than ischium, with 4 long setae and many short setae on inner margin; propouids almost as long as carpus.

Penes(Fig.177 L) fusiform.

Male first pleopod(Fig.177 L); endopodite rather short terminal part with 20 denticles; exopodite triangular and rather long.

Male second pleopod(Fig.177 M); endopodite rather short and wide; exopodite long with a rectangular dent on outer margin.

Remarks : The present specimens are allies to *Sphaerillo obsculus* (BUDDE-LUND), distributed in Eastern Honshu, but the former is separated from the latter in the following features: (1)presence of 2 rows of longitudinal darker lines, (2)narrower exopodite of male first pleopod, (3)absence of denticles on the endopodite of male first pleopod, (4) longer pleotelson, and (5)longer endopodite of male second pleopod.

***Sphaerillo hasegawai* n.sp.**

(Jap. name:Kôzu-koshihiro-dangomushi, new)

Fig.178

Material examined: 6♂♂(1♂, holotype, 5.4 mm in body length, ♂♂,paratypes, 5.0~7.2 mm in body length) and 3 ♀♀(1♀ allotype, 7.0 mm in body length and 2♀♀ paratypes 6.7 7.1 mm in body length, Kozushima Island, coll.Masami Hasegawa Apr.17~18, 1987. Type series is deposited as follows: holotype(TOYA-Cr-10861), allotype(TOYA Cr-10862) and 3 paratype(TOYA Cr-10863~10865) at the Toyama Science Museum; 2 paratypes (OMNH Ar-3473~3474) at the Osaka Museum of Natural History and 2 paratypes (CBM-ZC 726~727)at the Natural History Museum and Institute, Chiba. at the Chiba Prefectural Museum and Institution.

Description : Body convex, 1.9 times as long as wide. Body colour brown with paler irregular patterns. Cephalon rectangular with straight anterior margin. Eye mediocre, each eye composed of 12 ocelli. First peraeonal somite; hind corner with a lateral margin grooved along its length; schisma rounded but narrow. Second peraeonal somite with a pair of small teeth. Pleotelson hour-grass-shaped, with a pair of lateral concavities; distal end almost straight.

First antenna(Fig.178 C); first segment rectangular; second segment short; terminal segment rectangular with 3 short aesthetascs at the tip.

Second antenna(Fig.178 D); mutual length of 5 peduncular segments is 2: 7: 6: 8: 10. Flagellum as long as the fourth peduncular segment, terminal segment 3 times as long as the basal one.

Right mandible(Fig.178 E); pars incisiva 2-headed; lacinia mobilis single-toothed ; 2 hairy bristles between lacinia mobilis and processus molaris; processus molaris is represented by a

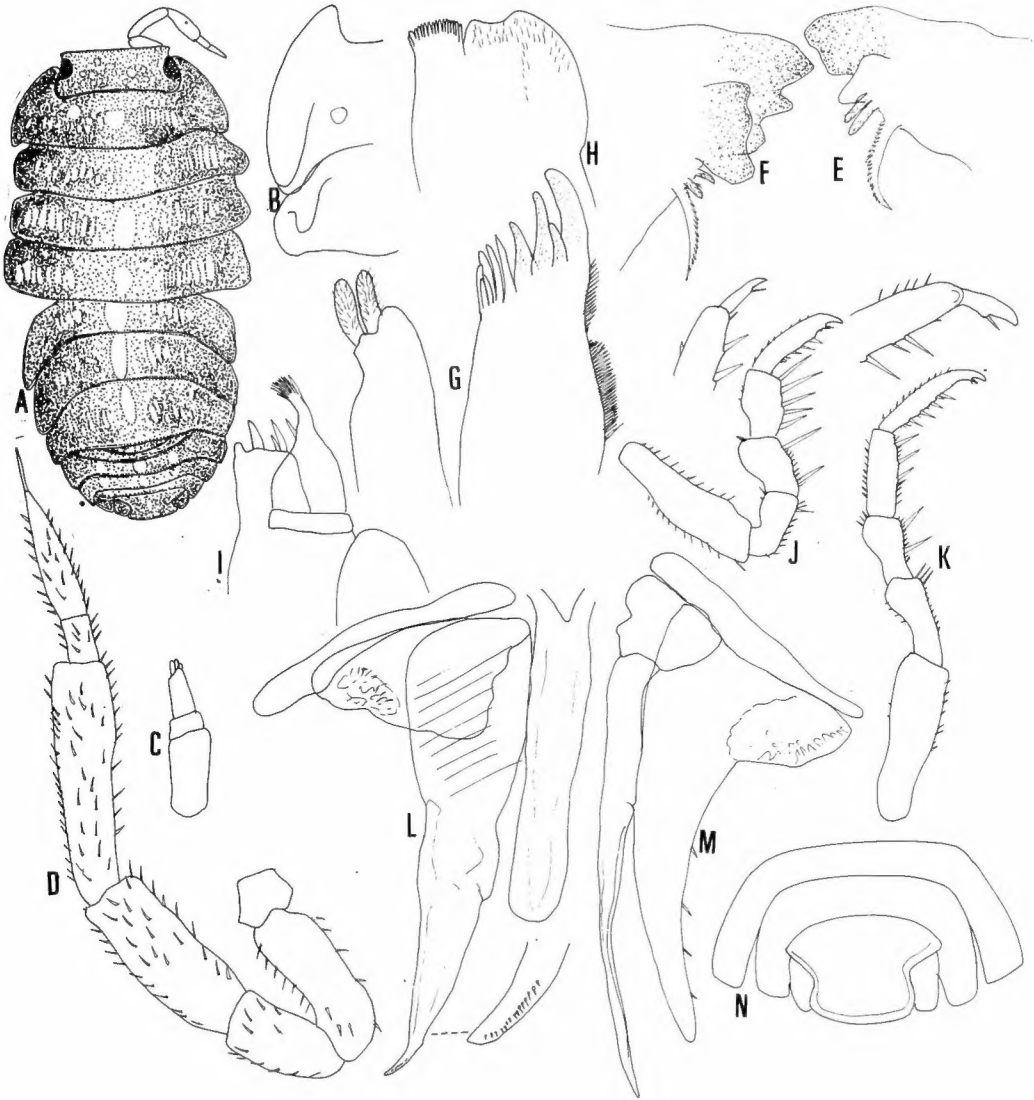


Fig.178 *Sphaerillo hasegawai* n.sp.

A.Dorsal view; B. Ventral view of first and second pereopodal somites; C.First antenna; D.Second antenna; E.Right mandible; F.Left mandible; G.First maxilla; H. Second maxilla; I.Maxilliped; J.First pereopod; K.Seventh pereopod; L.Penes and male first pleopod; M.Male second pleopod; N.Pleotelson and uropods (All: Holotype male).

long hairy bristle.

Left mandible(Fig.178 F); pars incisiva 3-headed; lacinia mobilis single-toothed; 2 hairy

bristles between lacinia mobilis and processus molaris; processus molaris is represented by a long hairy bristle.

First maxilla(Fig.178 G); outer lobe with 10 (4+6) simple straight teeth on distal margin; inner lobe with 2 brush-like setae and a hump-like projection at the tip.

Second maxilla(Fig.178 H) wide.

Maxilliped(Fig.178 I); endite rectangular with 4 stout spines on the distal margin; palp stout.

First peraeopod(Fig.178 J); basis oblong; ischium rectangular; merus almost as long as ischium and with 2 longer and several smaller setae on inner margin; carpus a little longer than merus and with 5 long setae on inner margin.

Seventh peraeopod(Fig.178 K); basis oblong; ischium rectangular; merus almost as long as ischium and with 2 longer and several smaller setae on inner margin; carpus a little longer than merus and with 3 longer setae and many shorter setae on inner margin; propodus long with 4 longer and several shorter setae on inner margin.

Penes(Fig.178 L) stout rectangular.

Male first pleopod(Fig.178 L); exopodite small and rectangular; endopodite stout and rather short with 5 small denticles near the apical part.

Male second pleopod(Fig.178 M); exopodite elongated; endopodite straight and longer than exopodite.

Remarks : The present new species is most closely allied to *S. boninensis* NUNOMURA, but it is separated from *boninensis* in the following features:(1)less protruded penes, (2) longer exopodite of male first pleopod and (3)longer carpus and merus of seventh peraeopod.

The present new species is also closely allied to *S. daitoensis* NUNOMURA, but it is separated from *S.daitoensis* in the following features: (1)longer endopodite of male second pleopod, (2)longer pleopod telson, and (3)longer carpus and merus of seventh peraeopod.